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## New Species of Uredineae—II

By J. C. ARTHUR

The following species of Uredineae have come to light, for the most part, from material kindly sent me by various collectors and students. In some cases they proved to be entirely unrepresented in my herbarium, but in other cases they had been known for some time, yet in too fragmentary condition to permit of description. Collections of what appear to be common species but upon unusual hosts often prove, when studied in connection with large series, to be new or otherwise interesting forms. Collections from previously unexplored regions generally well repay careful study, even if at first sight they seem to contain nothing new. All the species of this paper, except one from India, are from various parts of the United States. Thanks are due and are hereby extended to the several persons who contributed the material herein cited, as well as other material used for comparison during the study.

### **Uromyces Rickerianus** sp. nov.

I. Aecidia more hypophyllous than epiphyllous, in dense clusters; substratum scarcely thickened; peridia pale, low, erose; aecidiospores globose to oblong,  $16-22 \times 18-26 \mu$ ; wall thin, minutely verrucose, appearing smooth.

III. Teleutosori at first intermixed with the aecidia, especially on the petioles, elliptical, reaching 4 mm. in length, long covered by the delicate, gray epidermis, at length pulverulent, chocolate-brown; teleutospores dark brown, globose to oblong, somewhat irregular,  $20-25 \times 23-35 \mu$ , wall medium thick, apex not noticeably thickened, both apex and base rounded, pedicel colorless, fragile, very short.

On leaves of *Rumex Geyeri* (Meisn.) Trel., Teton Pass, Wy., July 13, 1901 (*Elmer D. Merrill* and *E. N. Wilcox*, no. 1217, comm. by P. L. Ricker).

The aecidia of this species bear a striking resemblance to those of *Puccinia phragmitis*, but have a little thinner and smoother wall, and are a trifle smaller; the gross appearance is about the same. The species is named in recognition of the interest taken

in plant rusts by Mr. P. L. Ricker, of the Bureau of Plant Industry, Washington, D. C., who has listed the Uredineae of Maine, and is now studying collections from the western United States.

***Uromyces rottboelliae* sp. nov.**

X. Amphisori hypophyllous, oblong, prominent, soon naked, chestnut-brown, ruptured epidermis noticeable; amphispores obovate-globose,  $18-25 \times 25-30 \mu$ , wall thick,  $3 \mu$ , golden brown, finely and closely tuberculate, pores 4, equatorial, pedicel colorless, delicate, about the length of the spore, semi-persistent.

III. Teleutospores globoid, of about the size and color of the amphispores, side wall about  $2 \mu$  thick, apex much thickened ( $8 \mu$ ), broad and almost truncate, base rounded, pedicel colorless, delicate, about the length of the spore, persistent.

On *Rottboellia speciosa* Hack. Jaunsar, Northwest Himalayas, India, 7,000 ft. alt., October, 1894 (*J. F. Duthie*, comm. by P. L. Ricker). This species was detected upon specimens in the phanerogamic herbarium of the U. S. Department of Agriculture by Mr. P. L. Ricker. It is notable for being the first Old World species observed possessing amphispores, so far as the writer knows. The amphisori have the gross appearance of teleutosori, the spores being dark colored and persistent. True uredospores were not seen, unless a few spores from parasitized sori were such; they differed from the amphispores only in having thin, yellow walls. Nor were teleutosori seen, the spores described being scattering ones from amphisori. In North America amphispores are known in *Puccinia vexans* Farl., and in a number of other species, but in none belonging to the genus *Uromyces*.

***Puccinia tosta* sp. nov.**

O, I. Spermogonia and aecidia unknown.

II. Uredosori amphigenous, small, brownish yellow, soon naked, ruptured epidermis inconspicuous; uredospores globose,  $20-30 \mu$  in diameter, wall brownish yellow, thin, about  $1.5 \mu$ , closely and minutely tuberculate, pores 6 or more, scattered.

III. Teleutosori amphigenous, prominent, round or oblong, blackish brown, early naked, ruptured epidermis not visible; teleutospores globoid to oblong,  $20-30 \times 30-40 \mu$ , rounded at both ends, slightly if at all constricted, side walls medium thick, apex thickened,  $5-10 \mu$ , pedicel thick, firm, tinted, once to twice the length of the spore, or longer.

On leaves and sheaths of *Sporobolus cuspidatus* (Torr.) Wood, Spirit Lake, Iowa, March, 1884 (*J. C. Arthur*), which is taken as the type, Aberdeen, S. D., Sept. 7, 1897 (*David Griffiths*), and Callaway, Neb., Oct. 2, 1901 (*J. M. Bates*, no. 2028). Also on *Sporobolus utilis* Torr., Las Vegas, N. M., Oct. 5, 1901 (*T. D. A. Cockerell*, comm. F. S. Earle), and Cochise, Ariz., Oct., 1900 (*David Griffiths*), and on *Sporobolus asperifolius* (N. & M.) Thurb., Billings, Mont., Aug., 1898 (*Williams & Griffiths*, comm. David Griffiths).

A rather common species in the semi-arid parts of the West, heretofore confused with other species of *Puccinia* on *Sporobolus*, more particularly with *P. sporoboli* Arth. The teleutospores are much shorter and more rounded than in *P. cryptandri* E. & B. and *P. vilfae* A. & H., and much shorter, broader, and the two cells more nearly equal in size than in *P. sporoboli* Arth. The uredospores of the four species are even more unlike, and are readily distinguished. In *P. sporoboli* they are echinulate, pores more than 4 and scattered; in *P. cryptandri* they are echinulate with 4 equatorial pores; in *P. vilfae* they are tuberculate, with wall colorless, apex thickened and pores obscure; and in *P. tosta* they are tuberculate with wall colored, pores more than 4 and scattered. The form on *S. asperifolius* is somewhat divergent, but not markedly so in the specimen examined. The host of the two specimens recorded as on *S. utilis* is sometimes called *S. repens* Presl., but it is possible that neither name is correctly used for this grass, a very common form in the Southwest.

***Puccinia tosta luxurians* var. nov.**

II. Uredospores slightly larger than in the species, more strongly tuberculate, almost echinulate, wall thicker, about  $2\ \mu$ .

III. Teleutostori elongated, in part linear with acute ends; teleutospores larger, oblong,  $27-32 \times 43-55\ \mu$ .

On *Sporobolus airoides* Torr., Andrews, Ore., Aug., 1901 (*Griffiths & Morris*, comm. David Griffiths), which is taken as the type, and on same host, Billings, Mont., Sept., 1898 (*Williams & Griffiths*, comm. David Griffiths). In both gross and minute characters this form on *S. airoides* differs somewhat from the previously described species, but for the most part the differ-

ences appear to be what might come from a more luxuriant development. Nevertheless the degree and uniformity of divergence make it seem the better course to keep this form by itself for the present. The wisdom of the course will be shown when a larger series of specimens can be examined and cultures made.

***Puccinia aspera* Dietel & Holway, sp. nov.**

III. Sporen auf beiden Seiten der Blätter und an den Blattstielen, bisweilen Verkrümmungen hervorbringend, rundlich, gross, nackt, pulverig, kastanienbraun; Teleutosporen elliptisch oder oblong, in der Mitte schwach eingeschnurt, an beiden Enden abgerundet, an der Basis bisweilen verschmälert; Episor am Scheitel nicht oder nur wenig verdickt, gelbbraun, von groben unregelmässigen Warzen rau,  $30-42 \times 18-24 \mu$ ; Stiel hinfällig.

On *Saxifraga Mertensiana* Bong., Mt. Paddo, Wash., 7,000 ft. alt., Aug. 17, 1897 (*W. N. Suksdorf*, no. 537). This species resembles *Puccinia Jueliana* Diet., but has much larger and more pulverulent sori, and somewhat larger and slightly rougher spores. The description and part of the type specimen were transmitted to the writer by the authors of the species.

***Puccinia turrita* sp. nov.**

III. Teleutosori amphigenous, rounded,  $.5-1 \mu$  in diameter, early naked, chestnut brown; teleutospores elliptical or oblong, slightly abstricted,  $20-24 \times 37-48 \mu$ , base rounded, apex acute or obtuse, very coarsely and irregularly tuberculate, especially at the apex, pedicel delicate, fugacious.

On *Saxifraga bronchialis* L., Manitou, Colo., Aug. 13, 1888 (*E. W. D. Holway*). The spores of this species are much rougher than those of *P. aspera* D. & H.; they remind one of the roughness of the teleutospores of *Phragmidium subcorticium* Wint. The four saxifrage species, *Puccinia Pazschkei* Diet., *P. Jueliana* Diet., *P. aspera* D. & H., and *P. turrita*, form a series, the spores of all being nearly of the same size and general shape, but showing an increasing roughness of the surface, and shortening of the pedicel. They appear to be distinct species, however, and not merely variations of one form. The indications are that all four species are without aecidia and uredospores, but this can not be stated positively.

***Puccinia adenostegiae* sp. nov.**

III. Teleutosori caulicolous, round or united into effused masses, early naked, cinnamon-brown, ruptured epidermis inconspicuous; teleutospores oblong,  $15-22 \times 45-67 \mu$ , slightly constricted at the middle, apex obtuse, acute or sometimes acuminate, much thickened, base scarcely narrowed, side walls thin, pedicel delicate, somewhat tinted, as long as the spore or shorter.

On *Adenostegia pilosa* (A. Gray) Greene (*Cordylanthus pilosus* Gray), foothills near Stanford, Cal., Jan. 1, 1902 (*LeRoy Abrams*, comm. F. S. Earle). As many as three fourths of the spores in this collection, which was made in mid-winter, and therefore on dead stems, had germinated. The species appears to belong to the leptopuccinia group.

***Uredo panici* sp. nov.**

Chiefly hypophyllous; sori oblong, intercostal, brownish yellow, early naked, ruptured epidermis inconspicuous; spores oval or globoid,  $24-28 \times 26-37 \mu$ , wall thin, golden yellow, closely and conspicuously echinulate, pores more than 4, scattered.

On *Panicum amarum* Ell., Longboat Key, Fla., April 27, 1900 (*S. M. Tracy*, no. 6598), on Hog Island, Fla., Nov. 26, 1901 (*S. M. Tracy*, no. 7292, comm. F. S. Earle). The latter collection, which is accompanied by flowers of the host, is taken as the type. This uredo from its general appearance undoubtedly belongs to some *Puccinia* or *Uromyces*, although not a teleutospore could be discovered. The spores are larger than in any North American species inhabiting *Panicum* now known; the size of the spores, character of the surface, and arrangement of the pores, easily distinguish it.

***Uredo cephalanthi* sp. nov.**

Sori mostly hypophyllous, small, irregularly bullate, distributed without order, pale, long covered by the epidermis; spores small, at first pedicellate, obovate-globose,  $16-20 \times 20-26 \mu$ , wall thin, about  $1 \mu$ , closely and minutely echinulate, pores obscure, seemingly 4 and equatorial.

On *Cephalanthus occidentalis* L., Palmetto, Fla., Nov. 30, 1901 (*S. M. Tracy*, no. 7288, comm. F. S. Earle).

PURDUE UNIVERSITY,  
LAFAYETTE, IND.